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10/779,613	02/18/2004	Makoto Iwashima	50195-417	* 8884

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EXAMINER

PRESTON, ERIK D

ART UNIT PAPER NUMBER

2834

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**GROUP 2800**

**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 10/779,613  
Filing Date: February 18, 2004  
Appellant(s): IWASHIMA ET AL.

Wei-Chen Nicholas Chen  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed 8/23/2006 appealing from the Office action mailed 2/24/2006.

**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The statement of the status of claims contained in the brief is correct.

**(4) Status of Amendments After Final**

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellant's statement of the grounds of rejection to be reviewed on appeal is substantially correct. The changes are as follows:

**WITHDRAWN REJECTIONS**

The following grounds of rejection are not presented for review on appeal because they have been withdrawn by the examiner. In light of the certified translation of the applicant's foreign priority document that was submitted on 5/24/2006, the 35 U.S.C. §102(e) rejection of claims 1-8 and 18-20 in view of Takahashi et al. (US 2004/0183385) has been withdrawn.

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) Evidence Relied Upon**

DE 101 12 799 C1	Gründl et al.	10-2002
US 5,632,351	Ishiyama	5-1997
US 2001/0054730	Kim et al.	12-2001
US 2,942,165	Jackson et al.	6-1960

**(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

***Claim Rejections - 35 USC § 102***

Claims 1-10 & 18-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Gründl et al. (DE 10112799 C1; English Equivalent: US 2004/0164625).

With respect to claims 1 & 18, Gründl teaches a power converter arranged in series with a motor to form a unitary structure through which an output shaft extends, comprising: A plurality of coolers (Fig. 1, #40) each of which extends along a radial direction with respect to an output shaft (Fig. 1, #18) so as to be perpendicular to the output shaft, and having a cooling surface (the entire surface of the heat sink on which the power semiconductors are mounted is the cooling surface) defined by a direction parallel to the output shaft and the radial direction (the entire cooling surface extends axially and has finned portions that extend in the radial direction); and a power semiconductor module (Fig. 1, #46) mounted on the cooling surface of at least one of the plurality of coolers to supply electric power to a motor. It is noted that this claim

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makes no positive recitation of the cooling surface upon which the power semiconductor is directly mounted to being a 2-dimensional planar surface being defined by only the axial and radial directions.

With respect to claim 2, Gründl teaches the power converter of claim 1, wherein the output shaft includes a motor shaft.

With respect to claim 3, Gründl teaches the power converter of claim 1, wherein each of the plurality of coolers includes a plurality of cooling surfaces (the finned surfaces of the coolers), and each is defined by the direction parallel to the output shaft and the radial direction (as seen in Fig. 1).

With respect to claim 4, Gründl teaches the power converter of claim 1, wherein each of the plurality of coolers includes a set of coolers opposing one another, and each of the set of coolers extends along the radial direction (as seen in Fig. 1, each cooler is opposed by another positioned 180 degrees away from it).

With respect to claim 5, Gründl teaches the power converter of claim 1, wherein each of the plurality of coolers is mounted on a cylindrical structural member (Fig. 1, #28) surrounding the output shaft.

With respect to claim 6, Gründl teaches the power converter of claim 1, wherein each of the plurality of coolers is mounted on a structural member located at an end face of a motor (as seen in Fig. 1, the coolers are mounted on an external portion of the motor housing).

With respect to claim 7, Gründl teaches the power converter of claim 1, wherein each of the plurality of coolers includes a plurality of coolant passageways (the channels between the fins) that extend in parallel to the output shaft (as seen in Fig. 1).

With respect to claim 8, Gründl teaches the power converter of claim 1, wherein each of the plurality of coolers includes a plurality of cooling passageways (the channels between the fins) that extend along the radial direction.

With respect to claim 9, Gründl teaches the power converter of claim 1, wherein an end portion of each of the coolers is connected to a delivery conduit (which inherently exists, Paragraph 30) communicating with coolant passages (Fig. 1, #32) of the other of the plurality of coolers.

With respect to claim 10, Gründl teaches the power converter of claim 1, wherein an end portion of each of the plurality of coolers is connected to an annular coolant passage (Fig. 1, #32) connected to a coolant delivery conduit (which inherently exists, Paragraph 30) connected to a power converter.

With respect to claim 19 & 20, Gründl teaches the power converter of claims 1 & 18, wherein the plurality of coolers are arranged along corresponding radial directions, each of which is perpendicular to the output shaft, at circumferentially spaced intervals therebetween (as seen in Fig. 1).

### ***Claim Rejections - 35 USC § 103***

Claims 11 & 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishiyama (US 5632351) in view of Gründl et al. (DE 10112799 C1; English

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Equivalent: US 2004/0164625). Ishiyama teaches a capacitor disposed between respective ones of a plurality of heat sinks adapted to smooth a DC voltage, a current sensor (Fig. 2, #29 # 30) disposed in a corner section projecting from a cross sectional circular shape of a power converter and detecting output currents of the power semiconductor module, an AC output terminal (Fig. 2, #26) disposed in a corner section projecting from a cross sectional circular shape of a power converter and connecting a power converter and a motor, wherein the AC output terminal is a three-phase output terminal and has three output terminals (Fig. 2, #26-28), and each of the three output terminals is disposed in a corresponding one of three corner sections projecting from the cross sectional circular shape of the power converter, and further comprising a DC power input terminal (Fig. 2, #39) disposed in a corner section, projecting from a cross sectional circular shape of a power converter, in which no other component elements are located, but it does not teach a plurality of coolers each of which extends along a radial direction with respect to an output shaft so as to be perpendicular to the output shaft, and having a cooling surface defined by a direction parallel to the output shaft and the radial direction; and a power semiconductor module mounted on the cooling surface of at least one of the plurality of coolers to supply electric power to a motor. However, Gründl teaches the power converter of claim 1 (as described above). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the cooling structure of Ishiyama in view of the cooling structure as taught by Gründl because it provides a cooling means for power semiconductors that is compact, economically producible and reliable (Gründl, Paragraph 13).

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ishiyama (US 5632351) in view of Gründl et al. (DE 10112799 C1) further in view of Kim et al. (US 2001/0054730). Ishiyama in view of Gründl teaches the power converter of claim 11, but it does not teach that the capacitor has a cross sectional shape formed in a fan-shape or a trapezoid. However, Kim teaches a capacitor that has a trapezoidal cross sectional shape (Paragraph 30). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the capacitor of Ishiyama in view of the capacitor as taught by Kim because it has a high dielectric constant while avoiding a degradation in the capacitance (Kim, Paragraphs 6,8 & 11).

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gründl et al. (DE 10112799 C1) in view of Jackson et al. (US 2942165). Gründl teaches the power converter of claim 1, wherein each of the plurality of coolers has a pair of cooling surfaces, and terminals of the power semiconductor module are mounted on one of the pair of cooling surfaces, but it does not teach that the power semiconductor module is mounted on both sides of the coolers, or that terminals of the power semiconductor modules have a symmetric relationship with those on the other cooling surfaces with respect to a corresponding one of the plurality of coolers. However, Jackson teaches a cooler (Fig. 2, #6) with a pair of cooling surfaces upon each of which is mounted a semiconductor device (Fig. 2, #1-5). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the coolers of Ishiyama in view of the cooler as taught by Jackson because it provides a rectifier assembly that has a



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minimum bulk, but which dissipates heat losses with a high efficiency (Col. 1, Lines 42-45).

**(10) Response to Argument**

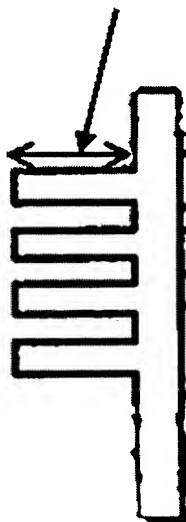
**A. Claims 1-8 and 18-20 rejected under 35 U.S.C. §102(e) over Takahashi**

As was noted above, the certified translation of the priority document submitted on 5/24/2006 was sufficient to overcome the Takahashi reference.

**B. Claims 1-10 and 18-20 rejected under 35 U.S.C. §102(b) over Gründl**

In response to the appellant's argument that the cooling surface of Gründl is not defined by (1) a direction parallel to the output shaft and (2) a radial direction perpendicular to the output shaft, it is noted that, as illustrated below, a portion of the cooling surface of the heat sink of Gründl is in fact defined by both the axial and radial directions.

radially extending portion of the cooling surface



Outline of the entire cooling surface

There is no positive recitation in the claims that the power semiconductor module must be mounted directly on the portion of the cooling surface that extends in the radial direction; there is only a recitation of the cooling surface including a surface that is defined by both the radial and axial directions, a structure that is taught by Gründl. It is also noted by that the power semiconductor module of Gründl could be broadly interpreted as being is mounted on the radially extending portion of the cooling surface because of its integral attachment therewith. The claims do not require the power semiconductor module to extend in the radial and axial directions along with the cooling surface, only that they be mounted on a cooling surface that does. Such an arrangement is taught by Gründl.

**C. Claims 11 and 14-17 rejected under 35 U.S.C. §103(a) over Ishiyama and Gründl**

In response to the appellant's argument that Ishiyama fails to teach a cooling surface that is defined by both a direction parallel to the output shaft and the radial direction, it is noted that with respect to claim 11, the Ishiyama reference is only relied upon to teach a capacitor disposed between respective ones of a plurality of coolers and adapted to smooth a DC voltage. As was stated above, the Gründl reference teaches a cooling surface that is defined by both a direction parallel to the output shaft and the radial direction with a semiconductor device mounted thereto.

**D. Claim 12 rejected under 35 U.S.C. §103(a) over Ishiyama in view of Gründl in view of Kim**

See arguments above with respect to claim 11.

**E. Claim 13 rejected under 35 U.S.C. §103(a) over Ishiyama in view of  
Gründl in view of Jackson**

See arguments above with respect to claim 11.

**(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,



Erik D. Preston

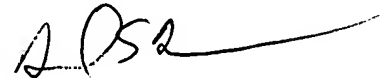
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